

REMARKS

This paper is filed in response to the Office Action mailed on September 22, 2004. Claims 1, 7-9 and 15 have been amended and claims 2, 6, 10 and 14 have been cancelled. Claims 1, 3-5, 7-9, 11-13 and 15-16 remain pending.

Applicants Respectfully submit that this amendment is in full compliance with Rule 116 as the total number of pending claims has been decreased, independent claims 1 and 9 have been amended by combining the limitations of those claims with dependent claims 2, 6 and 10, 14 respectively. Thus, no new issues have been raised and no additional searching is required. An early entry of this amendment after final is earnestly solicited.

Turning to the rejections based upon the prior art, claims 1-4 and 9-12 stand rejected under 35 U.S.C. §102(e) as allegedly being anticipated by U.S. Patent No. 6,362,059 (“Fukasaku”). In response, the limitations of claims 2 and 6 have been combined into independent claim 1 and the limitations of claims 10 and 14 have been combined into the limitations of independent claim 9, thereby traversing this rejection.

Specifically, Applicants respectfully submit that the anticipation rejection is improper for the following reasons. Under MPEP § 2131,

[t]o anticipate a claim, the reference must teach every element of the claim. A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.

Citing, *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Fukasaku fails to teach or suggest at least two elements of independent claims 1 and 9. First, Fukasaku does not teach an anneal step after the ion implantation to activate the dopant as admitted by the Patent Office on page 4 of the Office Action. Consequently, Fukasaku does not teach or suggest performing the annealing by a rapid thermal process before the Fukasaku gate insulation layer 5 is removed as required by independent claims 1 and 9. Thus, because Fukasaku does not teach or suggest the rapid thermal process to activate the dopant or the performance of a rapid thermal process prior to the removal of its gate insulation layer 5 or a screen oxide layer (without admitting that Applicants screen oxide layer is equivalent to

Fukasaku's gate insulation layer 5), the anticipation rejection based upon Fukasaku is improper and should be withdrawn.

Next, the Office Action rejects claims 5 and 13 under 35 U.S.C. §103 as being unpatentable over Fukasaku in view of U.S. Patent No. 5,605,849 ("Chen"). In response, Applicants present the following remarks.

At the outset, under MPEP §§ 2142 and 2143,

[t]o establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure.

Citing, *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991); see also MPEP § 2143-§ 2143.03 for decisions pertinent to each of these criteria.

Applicants respectfully submit that *prima facia* case of obviousness has not been presented for claims 5 and 13. Specifically, Fukasaku fails to teach or suggest an annealing or a rapid thermal process to activate the dopant or the performance is such a process before a removal or etching of its gate insulation layer 5. Chen, on the other hand, is merely cited for the proposition that it teaches implantation tilt angles. At column 6, lines 27-28, Chen also teaches away from performing a rapid thermal process or an anneal process before removal of an insulation or oxide layer because Chen specifically teaches an annealing after removing the photoresist 56. Thus, any combination of Fukasaku and Chen teaches away from the limitations of independent claims 1 and 9 which recite performing a rapid thermal process prior to removal or etching of the screen oxide layer. Accordingly, Applicants respectfully submit that any obviousness rejection based upon Fukasaku and Chen is improper and should be withdrawn.

Finally, the Office Action rejects claims 6-8 and 14-16 under 35 U.S.C. §103 as being unpatentable over Fukasaku in view of U.S. Patent No. 6,555,484

(“Ramkumar”) and U.S. Patent No. 6,245,639 (“Tsai”). In response, Applicants present the following remarks.

Specifically, as admitted by the Patent Office, Fukasaku fails to teach or suggest an annealing treatment to activate the dopant and Applicants respectfully submit that Fukasaku also fails to teach or suggest performing an annealing treatment prior to removal or etching of its gate insulation layer 5. In the first process step after forming the N-channel region 7 in Figure 4A of Fukasaku, Fukasaku teaches a wet etching of the gate insulation film 5. See column 4, lines 64-67. Fukasaku also does not teach or suggest any annealing or rapid thermal processing to activate the dopant.

In an attempt to supplement Fukasaku in this regard, the Patent Office relies upon Ramkumar. While Ramkumar teaches an annealing step, Ramkumar teaches the annealing for purposes of defusing the dopant, not activating the dopant. In any event, Ramkumar teaches such an annealing to activate arsenic or phosphorous dopant materials not the combination of boron and another Group III dopant as recited in independent claims 1 and 9.

Further, Ramkumar is directed toward a single step implantation. See Ramkumar column 3, lines 8-11. There is no teaching or suggestion that the annealing step conducted by Ramkumar is a rapid thermal process or that the annealing step taught by Ramkumar could be adapted for a boron/Group III implantation process. Thus, not only would the annealing step of Ramkumar have to be modified to make it a rapid thermal process, one skilled in the art would also have to guess that such an annealing step would be suitable for boron and indium. While these dopants are listed in Ramkumar, Ramkumar is clearly directed toward an arsenic and phosphorous dopant. Further, instead of dopant activation, the Ramkumar anneal is directed toward diffusion, not activation.

Therefore, there is simply no suggestion in Ramkumar and Fukasaku to make the proposed combination as recited in page 4 of the Office Action. Further, there is no teaching or suggestion in either of these references to modify the Ramkumar annealing step to a rapid thermal process as recited in independent claims 1 and 9.

Tsai is cited for the proposition that it teaches a rapid thermal process. However, the Tsai patent is directed only towards arsenic and phosphorous. See column 5, line 20. Further, Tsai in no way teaches or suggests performing a RTP

process prior to removal of a screen oxide layer. In the Tsai reference, there is no screen oxide layer and a gate structure 3 has already been formed.

Thus, Applicants respectfully submit that the vast differences in the structures and devices of Fukasaku, Ramkumar and Tsai render these references not combinable under the guidelines of §2142 as set forth above. Specifically, Ramkumar is directed toward a single step implant and the annealing is performed for purposes of diffusion, not activation. There is no suggestion or motivation in either Ramkumar or Fukasaku to combine the annealing step of Ramkumar with the two-step implantation process of Fukasaku. Further, Ramkumar does not teach or suggest a rapid thermal process as recited in independent claims 1 and 9.

On the other hand, in Tsai, by the time the annealing step is performed, the gate electrode 3 has already been formed and there is no overlying oxide or insulating layer. See Figures 5B and 5C of Tsai. There is no teaching or suggestion in Tsai that its rapid thermal process could be applied to the very different structure of Fukasaku. Therefore, Applicants respectfully submit that no *prima facia* case of obviousness has been established because there is no reasonable expectation of success if such a strained combination was made, because there is no motivation or suggestion to make such a strained combination and because any expectation of success could only be found in Applicants disclosure, not these three references.

Accordingly, Applicants respectfully submit that the obviousness rejection based upon Fukasaku, Ramkumar and Tsai is improper and should be withdrawn.

An early action indicating the allowability of this application and entry of this amendment is earnestly solicited.

The Commissioner is authorized to charge any fee deficiency required by this paper, or credit any overpayment, to Deposit Account No. 13-2855.

Respectfully submitted,

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